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Declass Review by NGA.

Post Office Box 8294
Southwest Station
Washington, D.C. 20024

Subject: 405 Chip Comparator
Water Damage and Microscope Slide

Gentlemen:

As a result of recent discussions relative to the 405 Chip Comparator and the problems presented by your technical representatives, we submit the following for your consideration

ITEM I

Prevent Water Damage resulting from spill and leakage in the lamp cooling assembly. Two approaches were investigated:

1) Design, manufacture and modify the 405 system to include special water collection containers with water level sensors and water presence sensors located in and near each reservoir assembly with an audio alarm and power cut off.

This patch up approach can not eliminate the cause of the problem. It can not guarant 100% failsafe operation because up stream leaks can not be instantaneously sensed without more extensive additions to the sensing and cooling systems. Furthermore, estimates indicate this non-recommended modification could exceed the cost of recommended approach number 2) outlined below.

2) Recommended Highly Reliable Approach To Prevent Water Damage
Eliminate the water as the source of the problem. Eliminate attendant wat damage repair and maintenance requirement by replacing the (2) Hg 198 Light Sources with one (1) common coherent laser light source and a two

channel fiber optic light pipe similar to those successfully field retrofitted on like commercial LSI-610 equipment. Such will guarantee elimination of all possible water damage, periodic water replacement, cleaning and associated water cooling parts maintenance. Also, this approach will minimize down time by eliminating complicated lamp replacement tasks because the new laser light source will be located in a convenient and easily accessible area. Laser light sources are guaranteed for 1000 hours operation or one year (whichever occurs earlier).

- The present (405 system) interferometers, if fitted with coherent laser light sources would be capable of higher operating speeds than now available with the Hg198 light sources. Thus, the interferometer would accommodate faster X-Y image scanning speeds. The maximum speed capability of the X-Y table, however, is not known at this time, but could be determined after the laser light source retrofit. The cost for any additional modification to increase the X-Y scan speed is not included at this time.

Included in Laser Light Source Retrofit

Add laser - power supply and optics with adjusting and mounting assemblies to focus beam on fiber optics and permit alignment with interferometer sensors. Add new filters and set up electronics for new light source also change optical phasing to compensate for different wave lengths.

- Remove most of unused items of the Hg 198 light source ; water reservoir and tubing. Disconnect power to present water cooling assembly, reroute dress-up and clamp all cables and tubing. Test and check-out.

Cost for above - System Modification Retrofit (First Unit)

FIRST SYSTEM ( LASER RETROFIT)
INSTALLATION

[redacted] *

Estimated @ 6 man days + travel and expenses

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STAT Cost of Follow-On Systems - [redacted] system plus installation

ITEM II

Microscope "Z" Axis Motion Slide must track smooth and straight with no jerking
STAT or cocking. Present [redacted] slides do not have adjustment gibs to permit take up adjustments for wear and tear.

The present slide arrangement could be reworked for improved performance; however, tighter fits would require more critical adjustments, and higher operator input torques while friction and stiction would present long term wear and reliability problems.

Recommendations

Replace existing slide arrangement with new precision bearing instrument slides. Such slides with appropriate mounting hardware will provide smooth, low friction positive tracking with low operator torque input.

In order to minimize field modification to existing mounts, yet live with existing one inch mounting space restriction, [redacted] will design, manufacture STAT
and install a precision ground bearing slide assembly and associated mounting hardware.

STAT First System Slide Retrofit [redacted] plus approximately 4 man days installation, travel and expenses

Four Additional Systems - [redacted] plus approximately 16 man days installation, travel and expenses

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[redacted]

Certain installation savings could result if the Laser Retrofit and Microscope Slide Retrofit were carried out simultaneously.

If you require additional information, please contact the undersigned.

Very truly yours,

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Program Manager

MJM:lmr

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